

# **AGRICULTURE MECHANICS II**

## **Curriculum Content Framework**

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# Curriculum Content Framework

## AGRICULTURE MECHANICS II

**Grade Levels: 10, 11, 12**  
**Course Code: 491110**

**Prerequisites: Agriculture Science and Technology and  
Agriculture Mechanics I**

Course Description: This course will emphasize agricultural technology including such topics as electricity, internal combustion engines, metal technology, construction, and the development, role and scope of mechanical technology in agriculture.

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# Unit 1: Introduction to Agricultural Mechanics

## 5 Hours

Terminology: none

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
1.1 Discuss the role of agricultural mechanics in the agricultural industry		Foundation	Speaking	Asks questions to clarify information [1.5.3]  Asks questions to obtain information [1.5.4]
		Personal Management	Organizational Effectiveness	Comprehends the organization's modes of operation [3.3.5]
1.2 Identify careers in agricultural mechanics	1.2.1 Research a career in agricultural mechanics to determine educational requirements, working conditions, and salary	Foundation	Reading	Applies information to job performance [1.3.4]  Uses standard occupational resource materials [1.3.22]
		Personal Management	Career Awareness, Development, and Mobility	Explores career opportunities [3.1.6]  Identifies continuing changes in male/female roles at home and work [3.1.7]  Identifies education and training needed to achieve goals [3.1.8]

<b>CAREER AND TECHNICAL SKILLS</b> What The Student Should Be Able To Do		<b>ACADEMIC AND WORKPLACE SKILLS</b> What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
1.3 List FFA opportunities available to students interested in agricultural mechanics		Foundation	Writing	Organizes information into an appropriate format [1.6.10]
		Interpersonal	Teamwork	Comprehends ideas and concepts related to FFA activities [2.6.1]
				Takes an interest in what others say and do [2.6.5]

## Unit 2: Safety Precautions in Agricultural Mechanics

### 5 Hours

Terminology: Combustion, Extinguish, Noise intensity

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
2.1 Define safety terms		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
2.2 Identify the most frequent cause of accidents in the agricultural mechanics lab		Foundation	Listening	Comprehends ideas and concepts related to agricultural mechanics [1.2.1]
		Thinking	Creative Thinking	Makes connections between seemingly unrelated ideas [4.1.6]
2.3 List precautions that may be taken to prevent accidents in the lab	2.3.1 Develop a safety plan for your school's agricultural mechanics lab	Foundation	Listening	Receives and interprets verbal messages [1.2.8]
		Thinking	Decision Making	Considers risks when making a decision [4.2.3]
2.4 Identify safety colors associated with the agricultural mechanics lab		Foundation	Listening	Receives and interprets verbal messages [1.2.8]
		Thinking	Knowing How to Learn	Processes new information as related to workplace [4.3.5]
2.5 Explain how fires and fire extinguishers are classified	2.5.1 Explain the proper use of a fire extinguisher	Foundation	Science	Applies life-saving techniques [1.4.4]
		Thinking	Knowing How to Learn	Applies new knowledge and skills to agricultural structures [4.3.1]

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
2.6 Discuss basic first aid treatment for burns and cuts		Foundation	Science	Applies life-saving techniques [1.4.4]  Observes health code/sanitation requirements [1.4.19]
		Personal Management	Responsibility	Pays close attention to details [3.4.8]

## Unit 3: Oxyacetylene Welding and Cutting

### 15 Hours

Terminology: Bleeding the lines, Carbonizing Flame, Gauge, Neutral Flame, Oxidizing flame, Regulator, Tip Cleaner, Torch, Valve

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
3.1 Define terms in oxyacetylene welding		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
3.2 Identify uses of oxyacetylene welding and cutting	3.2.1 Label the parts of the oxyacetylene welding unit	Foundation	Speaking	Pronounces words correctly [1.5.9]  Speaks effectively using appropriate eye contact, gestures, and posture [1.5.11]
		Thinking	Creative Thinking	Develops visual aids to create audience interest [4.1.4]
3.3 Describe the three types of flames		Foundation	Science	Applies knowledge to complete a practical task [1.4.3]
		Thinking	Seeing Things in the Mind's Eye	Visualizes a system's operation from schematics [4.6.3]

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
3.4 Outline the steps in setting regulator pressures and turning off oxyacetylene welding equipment	3.4.1 Practice safety precautions associated with oxyacetylene welding and cutting	Foundation	Speaking	Applies/Uses technical terms as appropriate to audience [1.5.2]
	3.4.2 Perform a fusion weld with a filler rod in flat, horizontal, and vertical positions	Personal Management	Integrity/ Honesty/ Work Ethic	Complies with safety and health rules in a given work environment [3.2.2]
	3.4.3 Weld a butt joint with a brazing rod in flat, horizontal, and vertical positions		Responsibility	Maintains a high level of concentration in completion of a task [3.4.7]
	3.4.4 Repeat fusion weld without rod in corner welding position			
	3.4.5 Perform a straight line cut with a torch			



## Unit 4: Metal Technology

### 10 Hours

Terminology: Die, Solder, Sweating

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
4.1 Define terms for cold metal and sheet metal		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
4.2 Discuss examples of cold metal work in agriculture		Foundation	Writing	Writes logical and understandable sentences [1.6.23]
		Interpersonal	Teamwork	Contributes to group with ideas, suggestions, and effort [2.6.2]
4.3 Identify tools used in cold metal work and their functions	4.3.1 Practice safety precautions associated with cold metal work	Foundation	Reading	Follows written directions [1.3.13]
	4.3.2 Demonstrate the correct use of the hacksaw	Thinking	Decision Making	Accepts responsibility for decision [4.2.1]
	4.3.3 Cut metal using a cold chisel			Demonstrates decision-making skills [4.2.4]
	4.3.4 Tap a hole in flat metal			
	4.3.5 Thread round stock			
	4.3.6 Remove broken bolts from metal			
	4.3.7 Construct a U-bolt			

<b>CAREER AND TECHNICAL SKILLS</b> What The Student Should Be Able To Do		<b>ACADEMIC AND WORKPLACE SKILLS</b> What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
4.4 Identify uses of sheet metal in agriculture	4.4.1 Practice safety precautions associated with sheet metal work	Foundation	Reading	Draws conclusions from what is read [1.3.12]
	4.4.2 Demonstrate the process of marking and cutting sheet metal	Personal Management	Organizational Effectiveness	Comprehends the organization's modes of operation [3.3.5]
	4.4.3 Use pop rivets and sheet metal screws correctly			
	4.4.4 Patch holes in sheet metal			
	4.4.5 Solder different types of metals			
	4.4.6 Assemble a sheet metal box			
	4.4.7 Construct a template for tool fitting			
4.5 Match tools used in sheet metal work to their functions		Foundation	Speaking	Asks questions to clarify information [1.5.3]
		Interpersonal	Teamwork	Responds to listener feedback [1.5.10]  Works effectively with others to reach a common goal [2.6.6]

## Unit 5: Surveying 10 Hours

Terminology: Backsight, Bench Mark, Chain

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
5.1 Define the surveying terms		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
5.2 Discuss uses of surveying in agriculture		Foundation	Writing	Analyzes data, summarizes results, and makes conclusions [1.6.2]
		Thinking	Creative Thinking	Finds new ways of dealing with existing problems/situations [4.1.5]
5.3 Identify common types of levels		Foundation	Reading	Locates pertinent information in documents such as manuals, graphs, and schedules to perform tasks [1.3.18]
		Thinking	Knowing How to Learn	Processes new information as related to workplace [4.3.5]

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
5.4 Explain special considerations in caring for levels	5.4.1 Measure a distance by pacing.	Foundation	Arithmetic/ Mathematic	Makes rough measurements [1.1.28]
	5.4.2 Set up a level.			Performs basic computations [1.1.31]
	5.4.3 Adjust a level.	Interpersonal	Teamwork	Demonstrates understanding, friendliness, adaptability, empathy, and politeness in new and on-going group settings [2.6.3]
	5.4.4 Demonstrate sign language used in surveying.			
	5.4.5 Interpret field notes.			
	5.4.6 Set up a batter board for a building using a level.			
	5.4.7 Demonstrate the procedure for leveling an area.			Works effectively with others to reach a common goal [2.6.6]

## Unit 6: Concrete 10 Hours

Terminology: Mortar, Reinforcing rod, Screeding

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
6.1 Define concrete terms		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
6.2 Identify uses of concrete and masonry in agricultural mechanics		Foundation	Reading	Determines what information is needed [1.3.10]
		Thinking	Reasoning	Sees relationship between two or more ideas, objects, or situations [4.5.5]
6.3 Match tools used in concrete and masonry work to their functions		Foundation	Writing	Uses technical words and symbols [1.6.20]
		Personal Management	Integrity/ Honesty/ Work Ethic	Describes desirable worker characteristics [3.2.3]
6.4 List the ingredients used in making concrete and mortar	6.4.1 Demonstrate the ability to mix, stir, and spread mortar	Foundation	Science	Measures dry and liquid supplies [1.4.17]
		Interpersonal	Teamwork	Recognizes effects of positive/negative attitudes on co-workers [2.6.4]
6.5 Explain the use of various reinforcements in concrete		Foundation	Reading	Applies information and concepts derived from printed materials [1.3.3]
		Thinking	Reasoning	Applies rules and principles to a new situation [4.5.1]

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
6.6 List factors that determine the quality, durability, and strength of concrete	6.6.1 Estimate the amount of concrete needed for a specified job	Foundation	Listening	Listens for content [1.2.3] Listens to follow directions [1.2.6]
	6.6.2 Demonstrate the ability to mix and pour concrete	Thinking	Decision Making	Considers risks when making a decision [4.2.3]
6.7 Identify types of masonry blocks and their uses	6.7.1 Lay masonry blocks correctly with line and blocks	Foundation	Reading	Applies information to job performance [1.3.4] Follows written directions [1.3.13]
	6.7.2 Tool masonry joints	Thinking	Problem Solving	Devises and implements a plan of action to resolve problem [4.4.3]
	6.7.3 Construct a concrete landscape border			
	6.7.4 Construct a hexagon concrete stepping stone			
	6.7.5 Demonstrate how concrete blocks are laid between corners			

## Unit 7: Power Tools 10 Hours

Terminology: Belt Sander, Disc Sander, Miter Gauge, Orbital Sander, Push Stick, Rip Fence

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
7.1 Define power tools terms		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
7.2 Discuss uses of power tools in agricultural mechanics		Foundation	Science	Follows safety guidelines [1.4.16]
		Personal Management	Integrity/ Honesty/ Work Ethic	Complies with safety and health rules in a given work environment [3.2.2]
		Thinking	Decision Making	Considers risks when making a decision [4.2.3]
7.3 Identify power tools used in agricultural mechanics and their functions	7.3.1 Practice safety precautions associated with power tools	Foundation	Reading	Reads and follows instructions to operate technical equipment [1.3.19]
	7.3.2 Square a board using a hand circular saw	Personal Management	Organizational Effectiveness	Applies knowledge to implement work-related system or practice [3.3.4]
	7.3.3 Use the miter saw correctly			
	7.3.4 Construct common lap joints	Thinking	Decision Making	Generates options/alternatives [4.2.6]
	7.3.5 Demonstrate the ability to make a dado joint			
	7.3.6 Cut rafters using a power saw			

## Unit 8: Electricity

### 15 Hours

Terminology: Ampere, Circuit Breaker, Circuit, Conductor, Conduit, Electricity, Insulator, Kilowatt Hour, Ohm, Resistance, Short circuit, Volt, Voltage Drop, Watt

CAREER AND TECHNICAL SKILLS What The Student Should Be Able To Do		ACADEMIC AND WORKPLACE SKILLS What The Instruction Should Reinforce		
Knowledge	Application	Skill Group	Skill	Description
8.1 Define electricity terms		Foundation	Reading	Applies/Understands technical words that pertain to a subject [1.3.6]
8.2 Discuss the impact of electricity on agricultural mechanics		Foundation	Writing	Presents own opinion in written form in a clear, concise manner [1.6.14]
		Thinking	Seeing Things in the Mind's Eye	Visualizes a system's operation from schematics [4.6.3]
8.3 Identify the major causes of electrical accidents		Foundation	Reading	Locates pertinent information in documents such as manuals, graphs, and schedules to perform tasks [1.3.18]
		Thinking	Knowing How to Learn	Develops personal learning strategies – note taking, clustering related items, flash cards, etc. [4.3.2]



<b>CAREER AND TECHNICAL SKILLS</b> What The Student Should Be Able To Do		<b>ACADEMIC AND WORKPLACE SKILLS</b> What The Instruction Should Reinforce		
<b>Knowledge</b>	<b>Application</b>	<b>Skill Group</b>	<b>Skill</b>	<b>Description</b>
8.4 Interpret graphical electrical symbols for wiring plans	8.4.1 Practice safety precautions associated with electricity	Foundation	Arithmetic/Mathematic	Follows specified dimensions on plan [1.1.24]
	8.4.2 Make electrical splices	Personal Management	Responsibility	Exhibits enthusiasm in approaching and completing tasks [3.4.3]
	8.4.3 Install a ground-fault circuit interrupter			Maintains a high level of concentration in completion of a task [3.4.7]
	8.4.4 Select wire size appropriate to circuit load			
	8.4.5 Demonstrate the ability to wire the following: single-pole switch, series of receptacles, three-way switch, four-way switch, service box			
	8.4.6 Develop a complete wiring diagram for an agricultural mechanics shop			

# **Glossary**

## **Unit 1: Introduction to Agricultural Mechanics**

No terms

## **Unit 2: Safety Precautions in Agricultural Mechanics**

1. Combustion – Burning
2. Decibel – A standard unit of sound.
3. Extinguish – To put out a fire by cooling, smothering, or removing fuel.
4. Fire triangle – The three conditions – fuel, oxygen, and heat that must be present to produce a fire.
5. Focal color – used to draw attention to large items; provides contrast for the safety colors and creates pleasant surroundings for those using the shop
6. Fuel – Any material that will burn.
7. Heat – Any type of energy that causes the temperature to rise.
8. Noise duration – the amount of time a noise lasts.
9. Noise intensity – Energy in the sound waves.
10. Oxygen – A gas in the atmosphere that is necessary to support combustion.
11. Safety – Freedom of accidents
12. Slow moving vehicle – Reflective emblem consisting of an orange triangle with a red strip on each of the three sides.

## **Unit 3: Oxyacetylene Welding and Cutting**

1. Bleeding the lines – Removing gas pressure from all lines and equipment.
2. Carbonizing Flame – A flame with an excess of acetylene.
3. Gauge – A device used to measure and indicate pressure in a hose, pipe or tank.
4. Neutral Flame – A flame with a balance of acetylene and oxygen.
5. Oxidizing flame – Flame with an excess of oxygen.
6. Regulator – A device that keeps pressure at a set level or controls the rate of flow of gas or liquid.
7. Torch – An assembly that mixes gases and discharges them to support a controllable flame.
8. Tip Cleaner – Rods with rough edges designed to remove soot, dirt, or metal residue from the hole in the tip of a torch.
9. Valve – A device that controls the flow of a liquid or gas.

## **Unit 4: Metal Technology**

1. Brazing – Bonding with metals and alloys that melt at or above 840 degrees F when capillary action occurs.
2. Die – An instrument used to cut threads onto a rod or bolt.
3. Flux – Material that removes tarnish or corrosion, prevents corrosion from developing, and acts as an agent to help solder spread over metal.
4. Rivet – To spread or shape by hammering; a fastening device held in place by spreading one or both ends.
5. Solder – Mixture of tin and lead.
6. Soldering – Bonding with metals and alloys that melt at temperatures below 840 degrees F.
7. Sweating – Process of soldering a piece of copper pipe into a fitting.
8. Tap – A hardened, brittle, fluted tool used to cut threads into holes in metal.
9. Tinning – Bonding filler material to a base metal.
10. Weld – To join by fusion; the seam created by fusion.

## **Unit 5: Surveying**

1. Back Sight (BS) – A rod reading taken on a point of known elevation.
2. Bench Mark (BM) – A permanent point of known or assumed elevation from which a survey started.
3. Chain – A unit of measurement which equals 66'.
4. Contour line – Line connecting points on the land surface which have the same elevation.
5. Foresight – A rod reading taken place on a point of unknown elevation.
6. Height of Instrument – The elevation of the level line of sight of the crosshairs in the instrument with respect to the benchmark.
7. Pace – To walk with a slow or measured tread.

## Unit 6: Concrete

1. Batter boards – Board placed to carry level guide lines
2. Curing – Proper drying of concrete.
3. Masonry – Anything constructed of brick, stone, tile, or concrete units held in place with Portland Cement.
4. Moisture Barrier – Prevents movement of water, steam, or vapor.
5. Mortar – A mixture of Portland cement, finishing lime, water, and sand. Portland cement – Dry powder made by burning limestone and clay followed by grinding and mixing.
6. Reinforcing Rod – Reinforcing rods or bars of various sizes are used in masonry construction. They are formed from rolled steel and are similar to those used in reinforced concrete. Reinforcing rods may be smooth or may have deformed ridges. The size is generally specified as a number. The number corresponds to the diameter of the bar or rod in eighths of an inch. Reinforcement rods are used in solid reinforced masonry walls, masonry lintels, sills and pilasters. This type of construction is also employed at corners and at window and door openings.
7. Screeding – Striking off excess concrete to create a smooth and level surface.
8. Workable Mix – The consistency of wet concrete when the various ingredients are mixed together correctly.

## **Unit 7: Power Tools**

1. Belt Sander – Power tool with a moving sanding belt.
2. Disc Sander – Tool with a moving grit on a revolving plate.
3. Miter gauge – Adjustable, sliding device to guide stock into a saw at the desired angle.
4. Orbital Sander – A finishing sander that travels in a circular pattern.
5. Push Stick – A wooden device with a notch in the end to push or guide stock on the table of a power tool.
6. Rip Fence – A guide that helps keep work in a straight line with a saw blade.



## Unit 8: Electricity

1. Ampere – A measure of the rate of flow of a current in a conductor.
2. Circuit Breaker – A switch that trips and breaks the circuit when more than a specified amount of current passes through it.
3. Circuit – An electrical source and wires connected to an electrical device.
4. Conductor – Any material that will permit an electron to move through it.
5. Conduit – Protective tube with individual insulated wires running through it.
6. Electricity – Form of energy that can produce light, heat, magnetism, and chemical changes.
7. Insulator – Material that provides great resistance to the flow of electricity
8. Kilowatt Hour – The use of 1000 watts per hour.
9. Ohm – A measure of the resistance of a material to the flow of an electrical current.
10. Resistance – Any tendency of a material to prevent electrical flow.
11. Short Circuit – A condition that occurs when electricity flows back to its source too rapidly and trips fuses, burns wires and drains batteries.
12. Volt – A measure of electrical pressure.
13. Voltage Drop – Loss of voltage as electricity travels through a wire.
14. Watt – A measure of energy available or work that can be done using one ampere at one volt.